

Product User Guide

RFOT

Wireless Meat Temperature
Data Logger with External Probe



Photos courtesy of Bob's Processing



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To view the full MadgeTech product line,
visit our website at www.madgetech.com.



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About MadgeTech

MadgeTech simplifies how the world measures and records data

MadgeTech, Inc. is a global company, based in New England and founded on old-fashioned principles, customer service, quality, and trust. MadgeTech's President, Norman Carlson, started the company in 1996 and charted the growth of the product lines and services while maintaining those solid core principles.

Our Can Do team of engineers and technical staff consistently incorporate new and innovative ideas into our data loggers. In short, we push the envelope, raising the bar in innovation and quality. Our competitors have praised us by adopting many of our ideas as their own. Over time, MadgeTech has become the industry standard in the data logger market.

MadgeTech continuously develops new, cutting-edge products, creating solutions for our customers around the world in industries across the board. Our growing network of distributors has expanded our presence to markets far beyond our home-headquarters in New Hampshire, our products are now sold in over 100 countries around the world.

Our employees are committed to quality and customer satisfaction. Behind the full range of MadgeTech's products and services is the cumulative expertise of experienced engineers, manufacturing and electronic professionals and technicians. Our knowledgeable sales team can offer technical advice to assist in selecting the right product for each application, as well as providing after-sales support.

MadgeTech is dedicated to providing customers with reliable, affordable products, hassle-free ordering, and excellent service, saving customers time and money. It is our goal to earn your trust in meeting your needs and providing innovative solutions. The products and services that bear the MadgeTech name come with quality assurance and the best support in the industry today.



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Table of Contents

Complete System	1	MadgeTech 4 Software Features	12-13
Quick Start Steps	1	Wireless Diagram	14
RFOT Product Overview	2-3	Wireless Network Information	15
RFC1000 Product Overview	4	Mounting Instructions	15
RFC1000-IP69K Product Overview	5	Channel Programming	16
MadgeTech 4 Software Specifications	6	Product Maintenance	17
MadgeTech 4 Software Installation Guide ...	6-7	Recalibration	17
RFC1000 Set-Up Instructions	8	RMA Instructions	18
MadgeTech 4 Software Icon Library	9	Compliance Information	18
Device Operation and Settings	10-11	Support	Back Cover

Questions? For more details and instructions, please refer to the rest of this guide, visit us online at www.madgetech.com or contact us for support at (603) 456-2011.



A Complete Wireless Data Logging System

Data Logger



RFOT Wireless Data Logger

MadgeTech 4 Software



Interface Device & USB Cable



RFC1000 Wireless Transceiver

Power Adapter
(Included accessory with RFC1000)USB Cable
(Included accessory with RFC1000)

Quick Start Steps

1. Install the MadgeTech 4 Software and USB Drivers onto a Windows PC.
2. The RFC1000 interface device comes with a USB cable. Plug one end of the cable into an available USB port on the PC and plug the opposite end of the cable into the communication port on the RFC1000.
3. To activate the wireless mode on the RFOT Data Logger, unscrew the end cap and gently separate the end from the body of the logger 2-3 inches. Flip the black switch located inside to the wireless position to 1 (0 indicates non-wireless mode, 1 indicates wireless mode). Screw the end cap back in place and ensure the fit is tightly sealed.
4. Launch the MadgeTech 4 Software. All active MadgeTech Data Loggers that are within range will automatically appear in the connected devices window. Each data logger in the list can be identified by serial number (imprinted on the exterior of the logger).
5. To claim a device, select the desired data logger in the list and click the **Claim** icon.
6. Select the start method, reading rate and any other parameters appropriate for the desired data logging application. Once configured, deploy the data logger.
7. To download data, select the device in the list, click the **Stop** icon, and then click the **Download** icon. A graph will automatically display the data.

RFOT Product Overview

The MadgeTech RFOT is a two-way wireless meat cooking and cooling data logger. The RFOT's rugged design, equipped with a flexible piercing probe allows it to be used in harsh environments. The RFOT is perfectly suited for use in smoke houses, ovens and other cooking processes up to 212°F (100°C) as well as refrigerators and freezers down to -4°F (-20°C). The RFOT is completely splash proof, and can withstand wash down cycles. The RFOT records and transmits internal product temperature readings back to a central PC for instant real-time monitoring, even when a smoke house or freezer door is closed.

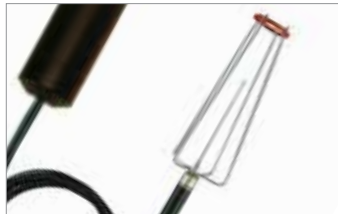
The RFOT never needs to be connected to a computer as it has been designed for two-way wireless communication. Full communication can be performed directly from a central PC. In addition to wirelessly transmitting data, the RFOT also stores each reading to the internal memory of the data logger for backup. This backup data may be retrieved wirelessly at a later time if need be. The RFOT allows the user to also set-up real time wireless alarming within the software, so that the user is notified by email or text message if an alarm condition has been met or exceeded. The RFOT helps the user comply with HACCP requirements as well as USDA regulations.

RFOT Options & Accessories



RFOT-SMP

Features a 2.5" probe for smaller diameter products such as hot dogs and sausage.



RFOT-HDA

Probe attachment designed for use with hot dogs, sausages and other small linked meat products.



RFOT-O-Ring

Replacement O-Rings for the RFOT.



TLH-5903

3.6V Lithium Battery.

Serial Number



RFOT Specifications

General Specifications

Reading Rate	One reading every two seconds to one every 24 hours
Memory	20,000 readings; software configurable memory wrap
Wrap Around	Yes
Start Modes	Immediate start & delayed start
Calibration	Digital calibration through software
Calibration Date	Automatically recorded within device
Battery Type	3.6V lithium battery included; user replaceable
Battery Life	2 years typical
Data Format	Date and time stamped °C, °F, K, °R
Time Accuracy	±1 minute / month (at 25°C)
Computer Interface	USB (interface cable required); 115,200 baud
Software	XP SP3/Vista/Windows 7/Windows 8
Operating Environment	-20°C to +100°C (-4°F to 212°F), 0%RH to 100%RH non-condensing
Dimensions	Body: 8.7" x 1.75" dia. (221mm x 44mm dia.) Hook ID: 0.5" (13mm) Probe: 4" x 0.125" (102mm x 3.2mm dia.) Cable Length: 30" (760mm)
Weight	8.8oz (250g)
Material	Body: Tecaform®, food grade Cable Jacket: Polyurethane
Approvals	CE, US (FCC), CA (IC)

Temperature

Probe Temperature Range	-50°C to +200°C (-58°F to +392°F)
Resolution	0.01°C (0.018°F)
Probe Calibrated Accuracy	±0.1°C (14°F to 302°F/-10°C to +150°C) ±0.5°C (outside of that range)

Resistance

Nominal Range	0 to 500Ω
Resolution	0.001Ω
Calibrated Accuracy	±0.015Ω
Specified Accuracy Range	0 to 500Ω at 25°C

Wireless

RF Frequency	2.45GHz IEEE 802.15.4 ultra-low power MagneNET wireless transceiver with fully bi-directional communication
Band	ISM band 2.405-2.48 GHz
Maximum Output Power	+0dBm typical
Receiver Sensitivity (RFC1000)	-95dBm typical
Range	2000' max. outdoors (line of sight unobstructed) 500' max. indoors (typical urban)

RFC1000 Product Overview

MadgeTech has designed the RFC1000, a high powered transceiver that has a substantially long transmission range, providing enhanced performance in occluded environments (ovens, refrigerators, etc.). The RFC1000 also features an external antenna, allowing more flexibility with mounting positions in both orientation and proximity to metal walls. The device may be used as a repeater, or directly plugged into the Windows PC.

Operating Environment

The RFC1000 is rated for use in an environment with temperatures from -20°C to 85°C and a humidity range of 0% to 95% RH non-condensing. The RFC1000 is rated IP40 and is protected against solids that are greater than 1mm in size. This device is not water resistant.

Installation Locations

- Main PC
- Hallways
- Retail Coolers
- Warehouse & Storage areas



RFC1000 Specifications

Interface Type	USB (to PC) / Wireless (to Data Logger)
Operating Environment	-20 to +85°C, 0 to 95%RH non-condensing
LED Indicators	Red: Indicates that the device has power Green: Will blink when communicating with the RFOT
Enclosure Materials	ABS Plastic (body), PVC Plastic (antenna)
Approvals	FCC ID: OA3MRF24J40MC, IC#: 7693A-24J40MC
Enclosure Dimension	3.8" x 1.6" x 0.8" dia. (96mm x 40mm x 20mm)
Antenna Dimension	7.2" (182mm)
Weight	5.5oz (156g)

Transmission Distance (To other RFC1000s)	4000' max. outdoor - line of sight unobstructed 1000' max. indoors - typical urban environment
Transmission Distance (To data loggers)	2000' max. outdoor - line of sight unobstructed 500' max. indoors - typical urban
Maximum number of connected data loggers (per RFC1000)	64
Frequency	2.405GHz - 2.475GHz
Ingress Protection	IP40

RFC1000-IP69K Product Overview

For environments that require high pressure, high temperature washdown, MadgeTech has designed the RFC1000-IP69K. This new waterproof transceiver can be installed directly in the wash down location, ensuring 100% communication throughout the entire process. MadgeTech has gone through extensive testing to ensure that the new RFC1000-IP69K can withstand wash down cycles using caustic chemicals, making it ideal for harsh environments. This model includes a high powered transceiver with an IP69K ingress protection rating. The RFC1000-IP69K has a substantial transmit range, providing better performance in occluded environments such as ovens and refrigerators. This new The RFC1000-IP69K also includes an external antenna which is protected by a neoprene boot.

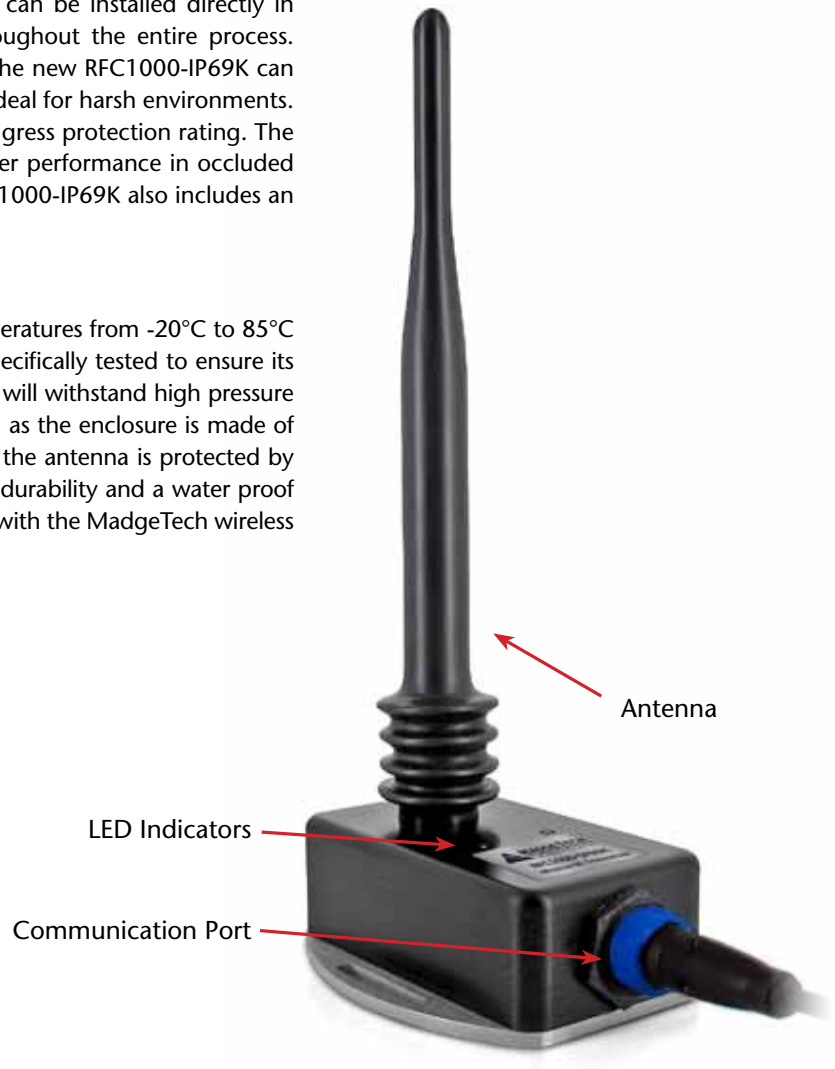
Operating Environment

The RFC1000-IP69K is rated for use in an environment with temperatures from -20°C to 85°C and a humidity range of 0 to 100% RH. The device has been specifically tested to ensure its ability to resist water ingress as well as dust. The RFC1000-IP69K will withstand high pressure and high temperature wash down cycles using caustic chemicals, as the enclosure is made of Acetal plastic. The cover is made of 300 series stainless steel and the antenna is protected by a Neoprene boot. This model is ideal for areas where additional durability and a water proof rating are required. The RFC1000-IP69K ensures communication with the MadgeTech wireless loggers even in the harshest of applications.

Installation Locations

- Processing Areas
- Near Smokehouse Locations
- Wash Down Areas
- Near Freezer/Refrigerator Areas

The power supply of the RFC1000-IP69K is not rated as splash proof. Exposing the power supply to moisture will potentially damage the unit. Additional precautions should be taken by the user if the power supply will be exposed to a condensing environment.



RFC1000-IP69K Specifications

Interface Type	USB (to PC) / Wireless (to Data Logger)
Operating Environment	Enclosure: -20°C to 85°C (-4°F to +176°F)
Enclosure Materials	Enclosure Body: Acetal Plastic Cover: 300 Series Stainless Steel Antenna Boot: Neoprene
Dimensions	Enclosure 3.4" x 2.9" x 1.3" With antennae, normal to case: 3.4" x 2.9" x 8.8" With antennae, laid down: 9.2" x 2.9" x 2.6"
Approvals	FCC ID: OA3MRF24J40MC, IC#: 7693A-24J40MC
Weight	14.1oz (400g)
LED Indicators	Red: Indicates that the device has power Green: Will blink when communicating with the RFOT

Transmission Distance (To other RFC1000s)	4000' max. outdoor - line of sight unobstructed 1000' max. indoors - typical urban environment
Transmission Distance (To data loggers)	2000' max. outdoor - line of sight unobstructed 500' max. indoors - typical urban
Maximum number of connected data loggers (per RFC1000)	64
Frequency	2.405GHz - 2.475GHz
Ingress Protection	IP69K

Installation Guide

Step 1: Installing the MadgeTech 4 Software & USB Drivers

MadgeTech 4 Software Specifications

MadgeTech Data Logger software requires an IBM or compatible PC with the following:



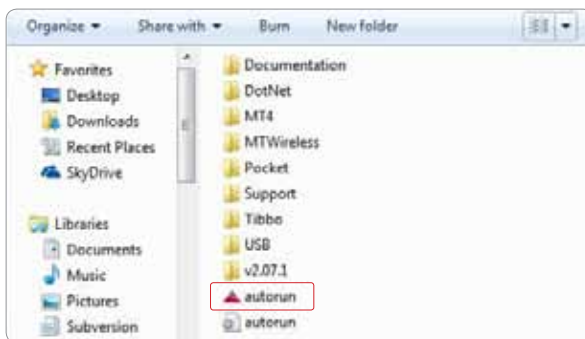
- PC-compatible Pentium(R)-class system
- Windows XP/Vista/Windows 7 (32 and 64 bit) and Windows 8
- Color SVGA monitor (800 x 600 resolution)
- 128MB (or more) RAM
- At least 30MB free hard disk space (for installation)
- USB Port (for installation media)
- Available 9 pin male serial (COM) port (for serial logger interface cable)
- Available USB port (for USB logger interface cable)



Installing the MadgeTech 4 Software

Insert the MadgeTech 4 Software Flash Drive into an open USB port on a Windows PC. If the autorun does not appear, locate the drive on the computer and double click on **Autorun.exe**. Follow the instructions provided in the Installation Wizard. Software can also be downloaded from the MadgeTech website at the following link: www.madgetech.com/software-download.

- 1 Locate the Autorun.exe file on the MadgeTech 4 Software Flash Drive.



- 2 Select "MadgeTech Software" in the MadgeTech Installer Options window panel.




If the Windows PC doesn't already have .NET 4.0 Framework, installation may be required.

To see if the .NET 4.0 Framework is installed, go to the Windows **Control Panel** and select **Programs**. "Microsoft .NET Framework 4.0" would be listed as a Windows program.

Select "Install MadgeTech Software" if .NET framework is installed on the Windows PC, or if installing on a Windows 8 machine.

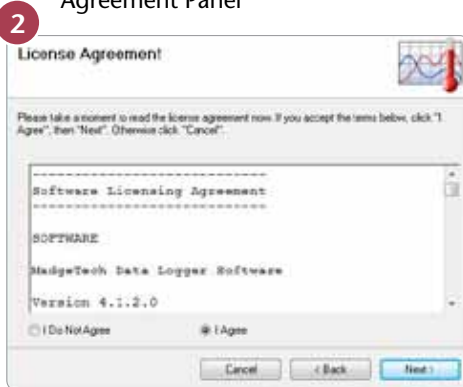
MadgeTech 4 Setup Wizard

1



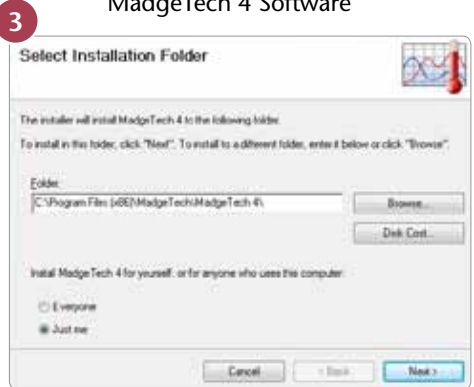
2

Select "I Agree" on the License Agreement Panel

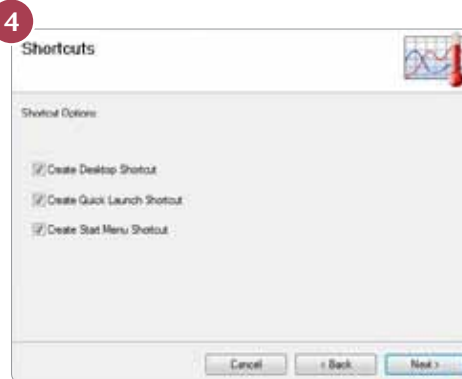


3

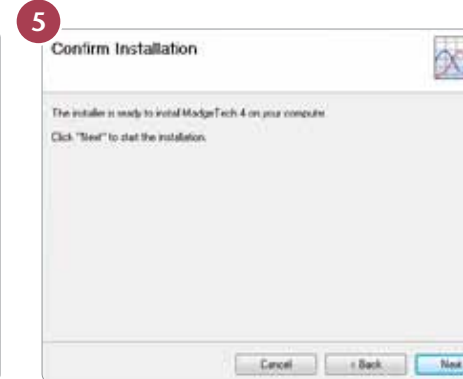
Select a destination to install the MadgeTech 4 Software



4



5




Once the installation is confirmed, the MadgeTech Software will begin to load to the Windows PC.

Installing the USB Driver

With the USB Flash Drive inserted into the computer, locate the drive on the computer and double click on **Autorun.exe**. Install the **USB Interface Drivers (under Drivers and Third Party Tools)**. The software can also be downloaded from the MadgeTech website at www.madgetech.com/software-download.




1



Select "Driver and Third Party Tools" in the MadgeTech Options window panel.

2



Select "Install USB Interface Drivers".

Once the installation of the software and driver is confirmed, the RFC1000 can then be connected to the computer.

RFC1000 Set-Up

Step 2: Connecting the RFC1000



Installing the RFC1000

The RFC1000 interface device comes with a USB cable.

1. Plug the USB end of the cable into an available USB port on the PC.
2. Plug the opposite end of the cable into the communication port on the RFC1000.



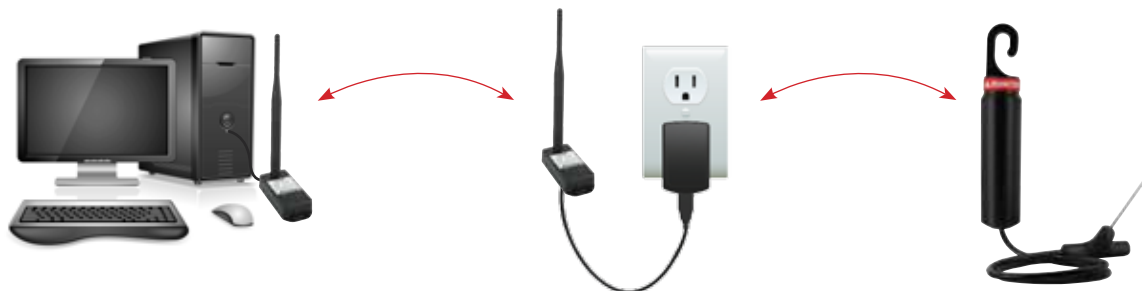
Use additional RFC1000s & RFC1000-IP69Ks as Repeaters

Additional RFC1000s can act as repeaters and may be plugged into wall outlets for greater distances.

1. Plug the RFC1000 into the USB port on the base station computer.
2. Plug additional RFC1000s into wall outlets.

Note: The red LED will illuminate to signify the RFC1000 has been connected correctly.

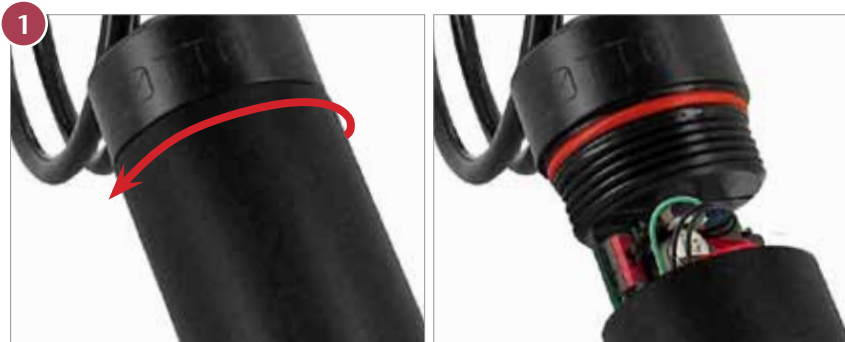
Determine the distance from the remote RFC1000s to the base module. If the distance is greater than 1000 feet indoors, or 4000 feet outdoors, or there are walls/obstacles/corners that need to be maneuvered around, set up additional RFC1000s as needed.



Installation Guide

Step 3: Wirelessly Connecting the RFOT to the RFC1000

To activate the wireless mode on the RFOT Data Logger, unscrew the end cap and gently separate the end from the body of the logger 2-3 inches.



Flip the black switch located inside to the wireless position to 1 (0 indicates non-wireless mode, 1 indicates wireless mode).



3. Screw the end cap back in place and ensure the fit is tightly sealed.

Using the MadgeTech 4 Software

Software Icon Library

Device Tab



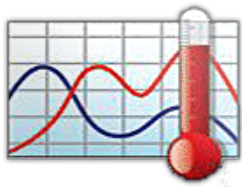
- | | | | | | |
|--|--|--|--|--|---|
| | Custom Start - Start the selected device(s) using custom settings | | Stop - Stop the selected device(s) | | Properties - View the properties and settings of the selected device |
| | Quick Start - Start the selected device(s) using the current settings | | Download - Download recorded data from the selected device(s) | | Engineering Units - Manage engineering units |
| | Real-Time Start - Start the selected device(s) in real-time mode | | Reset - Resets the selected device(s) | | Claim - Add the selected wireless device(s) to the network |
| | Batch Start - Automatically start devices of the same type as they're connected | | Manage Rules - Manage real time alarm rules | | Release - Remove the selected wireless device(s) from the network |
| | | | | | Locate - Find or identify a wireless device with an audible alarm |

Report Tab



- | | | | | | |
|--|--|--|---|--|--|
| | Generate - Generates a graph based on the current report, or a blank graph if no report is open | | Set Scale - Set the scale of the graph | | Generate - Generate a new grid based on the current report, or a blank grid if no report is open |
| | Select - Change the cursor function to select data points | | Lock Vertical Scale - Lock the vertical scale of the graph | | Generate - Generate a new statistics view based on the current report, or a blank view if no report is open |
| | Box Zoom - Change the cursor function to zoom in on a selected area | | Enable Autoscroll - Allow the graph to automatically shift along the time axis as real-time data points are added. | | Add/Remove - Manage custom statistic information. |
| | Horizontal Zoom - Change the cursor function to zoom in on a selected length of time | | Manage Axis Positions - Change which side of the graph each axis is positioned | | Device Properties - View the properties of the selected channel's associated device |
| | Vertical Zoom - Change the cursor function to zoom in on a selected unit range | | Timeslice - Manage timeslice options | | |
| | Fit to View - Zoom out to fit all data in view | | Set Cooling Flags - Set annotations for multiple temperature cooling points | | |

Device Operation and Settings



Launch the MadgeTech 4 software. All active loggers will be listed in the connected devices section showing that the RFOTs have been recognized.

Connected devices					
Search		Search by: No preference		<input type="checkbox"/> Only show claimed v	
Comm	ID	Type	Serial	Last Calibrated	Statu
MiWi	RFOT 2.4GHz	RFOT	W01103	3/6/2013	Stopp

Claim an RFOT



To claim an RFOT, find the device within the **Connected Devices** panel, Click to highlight, and then click the **claim** icon.

Starting the RFOT and Viewing Data in Real time

Once an RFOT is started in Real time, data transmitted to the software is automatically saved and stored in the software File Database. This data can be viewed as a report at any time and will automatically update as new readings are received.

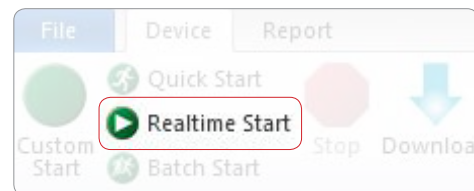
1. In the **Connected devices** panel, select a device to be started:

Connected devices			
Search		Search by: No preference	
Comm	ID	Type	Serial
MiWi	RFOT 2.4GHz	RFOT	W01103

2. On the Device ribbon tab, in the Control group, click **Real time Start**.

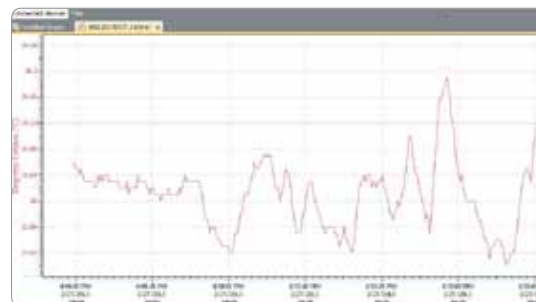
Note: Optional Start & Stop Methods

- Start Now:** The device will started immediately once the start button is clicked.
- Delay Start:** The device will be programmed, but will not start logging until a user specified time and date.
- Manual Stop:** The device will not stop logging until the Stop command has been selected in the software.
- Automatic Stop:** The device will be programmed to stop logging at a user specified time and date.



3. Click Start

4. A graph of the data will automatically appear on screen once the device begins logging.



What is the Difference Between a Dataset and a Report?

A **dataset** is the raw data that is downloaded from a device. This data cannot be altered.

A **report** is a visual representation of the data that can be changed as desired. Reports are created from datasets.

Viewing Data as Reports

Data can be interpreted in three different ways, as a **Graph**, **Grid** and/or **Statistics** view.

1. A graph report displays the data graphically.
2. A grid report displays the data in tabular format.
3. The statistics view provides statistics (i.e. minimum, maximum, average, etc.) for the dataset.

To generate a graph, grid, or statistic view from existing data, click on the "Datasets" folder in the 'File Database' panel.

The 'Datasets' panel will appear, select a dataset.

1. To generate a graph, in the 'Report' ribbon, 'Graph' tab control group, click the **Generate Graph** icon.
2. To generate a grid, in the 'Report' ribbon, 'Grid' tab control group, click the **Generate** icon.
3. To generate a statistics report, in the 'Report' ribbon, 'Statistics' tab control group, click the **Generate** icon.

Save a Report

Reports can be saved to either the internal file database within the software, or to a file stored on the user's PC. By default, new reports are saved to the Reports folder of the internal database in the File Database.

1. Click the tab or window containing the report to be saved.

2. Click the File Button, then click **Save**.



To Save to the User's PC

1. Click the tab or window containing the report to be saved.
2. Click the file button, then click **Save to**.
3. Choose the location where the file will be saved.
4. Click **Save**.

Stopping an RFOT

In the Connected Devices list, select the device to be stopped.

On the **Device** tab, in the **Control** group, click **Stop**.



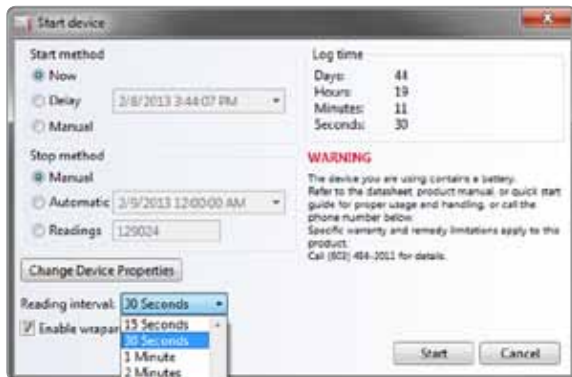
Wirelessly Downloading from an RFOT

If the power were to go out or the user's PC were to crash, the RFOT will still record data to memory. Once the power is restored the below steps can be taken to obtain the data from the memory of the RFOT.

Downloaded data will remain stored on the device until the device is reset or started.

1. In the device tab in the **Control** ribbon click on the **Download** icon.
2. The data from the internal memory of the RFOT will download into the graph.

MadgeTech 4 Software Features



Reading Rate

The reading rate indicates how often the device will take a measurement and record it to memory. The log time box will change to signify how long the device will record for before the memory becomes full.



1. With the logger connected and identified within the software, click on **Custom Start**.



2. Within the **Start Device** dialog box, navigate to **Reading Interval** and select a reading rate for the device.

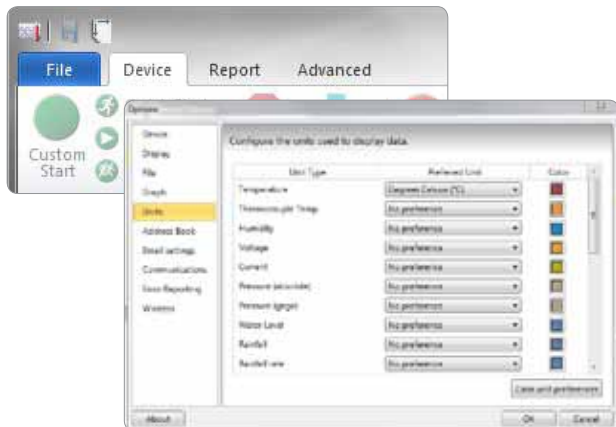
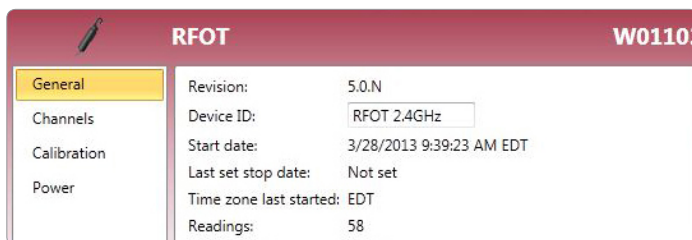
Device ID

With the logger connected and identified within the software, click on the **Device** tab then click the **Properties** icon.



The properties screen will display information about the device including the **Device ID**.

Up to a 6-character identification code may be programmed into the **Device ID** field.



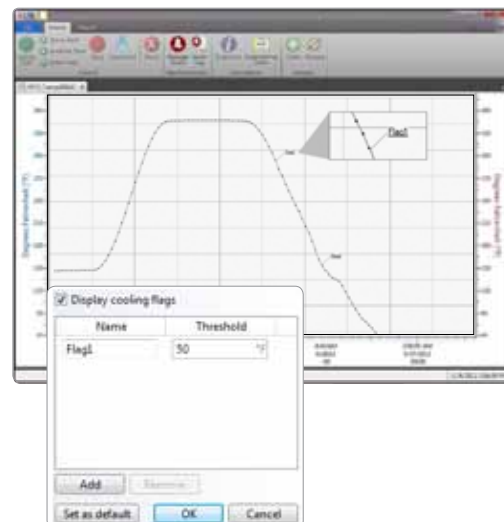
Changing Units of Measurement

1. To change the units of measurement within the software, click the **File** tab, and select the **Options** button at the bottom of the window.
2. Within the **Options** dialog box, select **Units** in the left hand navigation.
3. Select the desired unit of measure in the **Preferred Unit** dropdown box.

Cooling Flags

MadgeTech's easy-to-use software features user-programmable critical control points called "Cooling Flags" to assist in compliance with USDA appendix B. The "Cooling Flags" are automatically annotated on the graph.

1. Once the RFOT data has been downloaded, click the report tab and select the **Set Cooling Flags** button within the **Graph** group.
2. The "Cooling Flags" window will appear. The **Display Cooling Flags** box should be checked.
3. The user can then add flags with temperature threshold. All flags must be in descending order by temperature.
4. Once the number of flags required have been added, click **Set as Default** then **Save**.
5. The "Cooling Flags" will then be shown automatically as an annotation on the downloaded graph.
6. If there is more than one graph, default "Cooling Flags" will be applied.



RFOT Real time Wireless Alarming

1. On the Device ribbon tab, in the **Real time Alarms** group, click **Manage Rules**.



2. Click **New**.

Rules are applied in the following order:

Name	Enabled	New	Edit

1. Enter a name in the **Rule name** box.

Rule name:

2. Select whether notifications will occur when **All Conditions are met** or **Any condition is met**.

Perform actions when:

☐ All conditions are met ☒ Any condition is met

3. Select the conditions that need to be met before a notification will occur.

W00687 RFOT	Temperature	above	50	°F	for 1	hours		
W00687 RFOT	Temperature	below	20	°F	for 5	hours		

4. Select which notifications will occur (on screen, email, text message).

When conditions are met, do the following:

☐ Show on-screen notification

☒ Send email/text to

5. Select whether notifications will occur only once or on a regular basis.

How often should actions be performed?*

☒ Only when the alarm is first activated

☐ While conditions are still met, continue to perform actions every: minutes

6. If notifications are selected to be received by email or text message, click **Email settings** and make sure the correct information has been entered.

First name:	<input type="text" value="Test"/>
Last name:	<input type="text" value="Test"/>
Display name:	<input type="text" value="Test"/>
Email/Text address:	<input type="text" value="Test@madgetech.com"/>
Phone:	<input type="text" value="603-456-2011"/>
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

a. The user must obtain the **server address** and **port number**. This information can be obtained from the user's IT department.

b. A **From Email** must also be selected; this will tell the receiver who the email or SMS text message is from.

c. Security and authentication information may also need to be entered. This information can be obtained from the user's IT department.

d. Once all of the required information is entered, a test SMS text message or email can be sent by clicking on **Test Email Settings**.

Change email sender information.

SMTP settings

Server address:

Port:

From email:

Security and authentication

Security: ☒ Use SSL / TLS

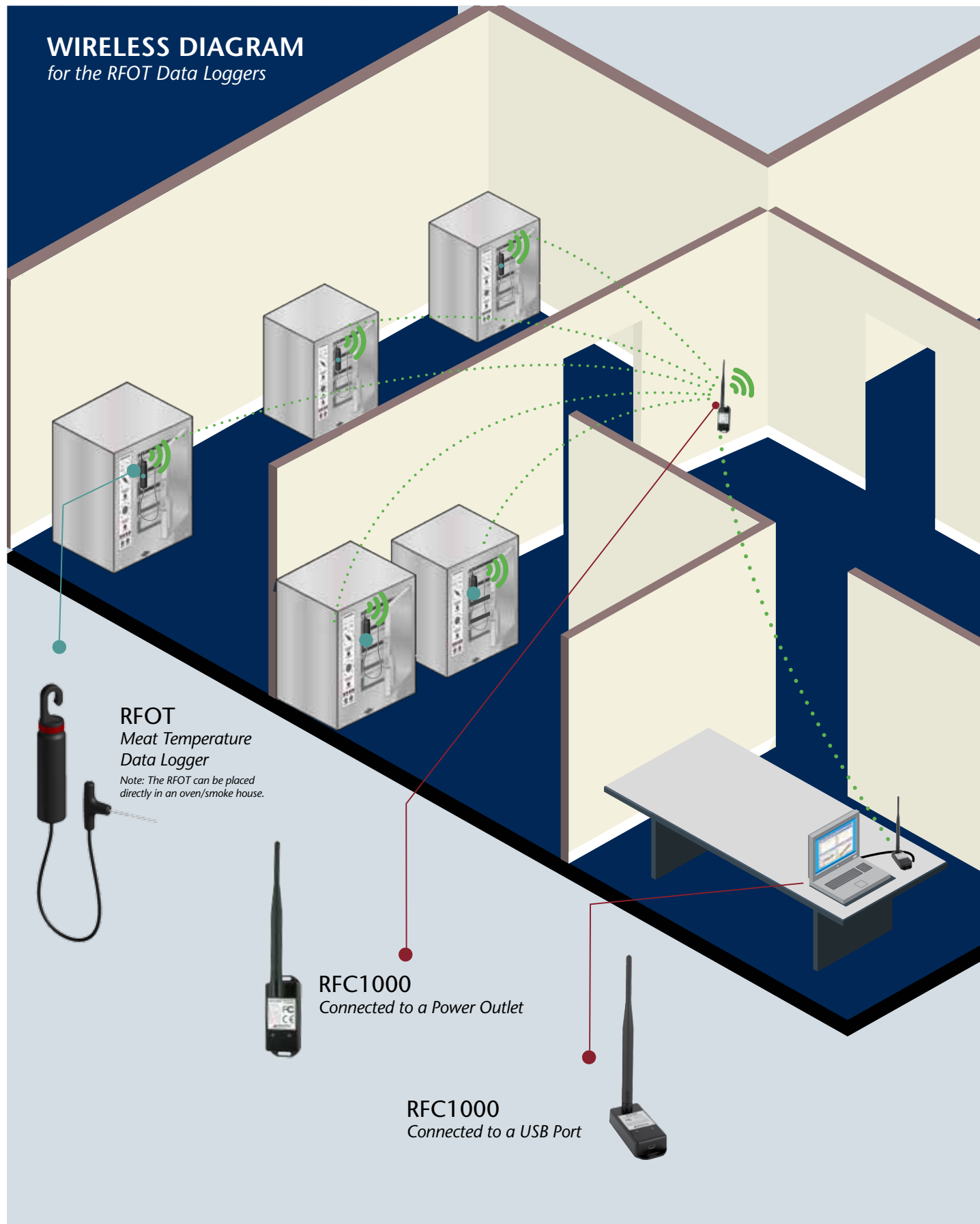
Username:

Password:

3. Click OK.

WIRELESS DIAGRAM

for the RFOT Data Loggers



Wireless Network Information

Self Healing Network

There is very little programming required by the user when RFOTs and RFC1000s are installed. Once installed, if an RFOT were to lose communication with an RFC1000, the data logger will automatically “search” the network for another available RFC1000. If multiple RFC1000s are available, the RFOT will automatically select the RFC1000 with the strongest signal.

Line-of-Sight & Transmission Distance

Typical transmission distance from an RFC1000 to another RFC1000 is as follows:

- 4,000 feet maximum outdoors – line-of-sight unobstructed
- 1,000 feet maximum indoors – line-of-sight unobstructed

Typical transmission distance from an RFC1000 to an RFOT data logger is as follows:

- 2,000 feet maximum outdoors – Line-of-sight unobstructed
- 500 feet maximum indoors – Line-of-sight unobstructed

Obstacles

Any obstacles will decrease the line-of-sight from an RFC1000 to another RFC1000 as well as the line-of-sight from an RFC1000 to an RFOT. Obstacles that interfere with or decrease the wireless signal could include but are not limited to smokehouse doors, freezer or refrigerator doors, building structures such as walls and metal beams and internal traffic such as forklifts and metal racks or carts. An additional number of RFC1000s can be placed near the obstacles to greatly help lengthen and strengthen the wireless signal.

Number of Data Loggers per RFC1000

Each RFC1000 has the capability to communicate with 64 RFOT data loggers. If more than 64 data loggers will be installed within the network it is recommended that multiple RFC1000s also be utilized.

Deflection

When a wireless signal “hits” an object such as a metal wall, the wireless signal will not just stop but rather it could turn a corner, bend or slow down. When installing the RFC1000s obstacles and possible deflection should also be considered.

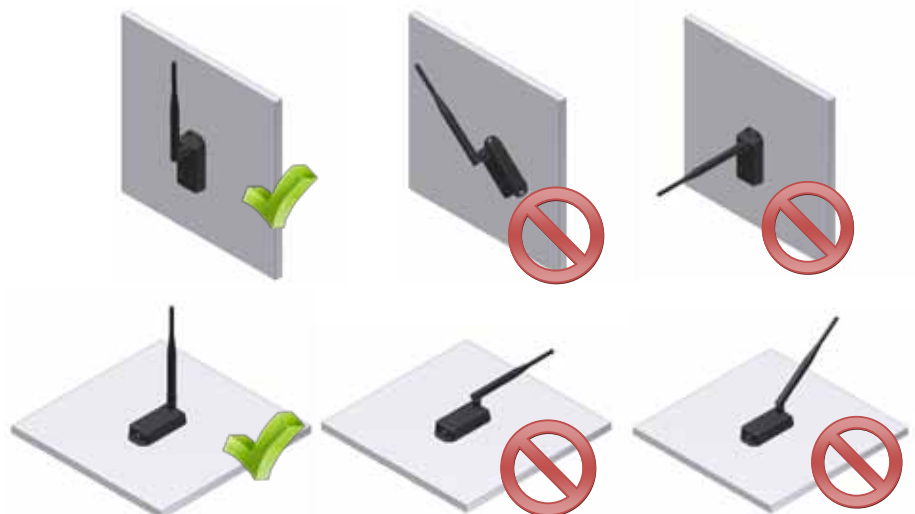
Mounting Instructions for the RFOT

For best performance, the RFOT should always be hung by the hook in an upright position. This will allow for the best path for the wireless signal.



Mounting Instructions for the RFC1000 & RFC1000-IP69K

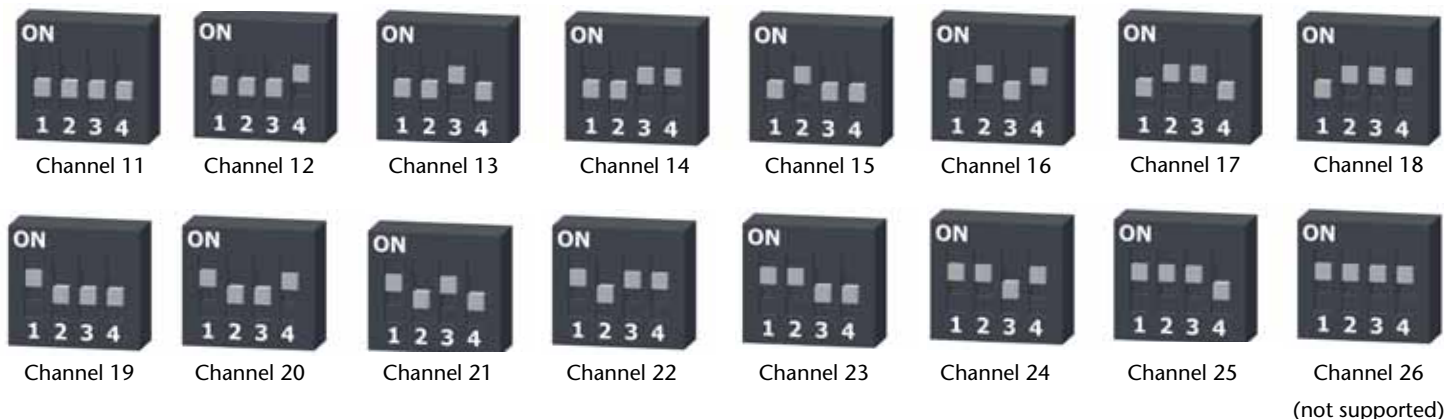
For best performance, both the RFOT and the RFC1000 should be mounted in the same orientation. As it is recommended that the RFOT be mounted in an upright position, the RFC1000 external antenna should be pointing straight up. The antenna on the RFC1000 can also pivot to accommodate a wall mount or a desk mount. If the user has multiple RFC1000s, the antennas will perform best when they are all pointing in the same direction. The antennas on the RFC1000s should also be at least 1.5 inches away from any metal.



Channel Programming

The RFC1000 transmits data on the 2.4GHz band and is programmed by default on channel 11. Each MadgeTech Wireless Data Logger and RFC1000 has a set of dip switches with which the channel may be programmed. Different wireless channels may be used to create multiple networks in one area, or to avoid wireless interference from other devices. Any MadgeTech data logger or RFC1000 that is on the same network is required to use the same channel. If all of the devices are not on the same channel, the devices will not communicate with one another.

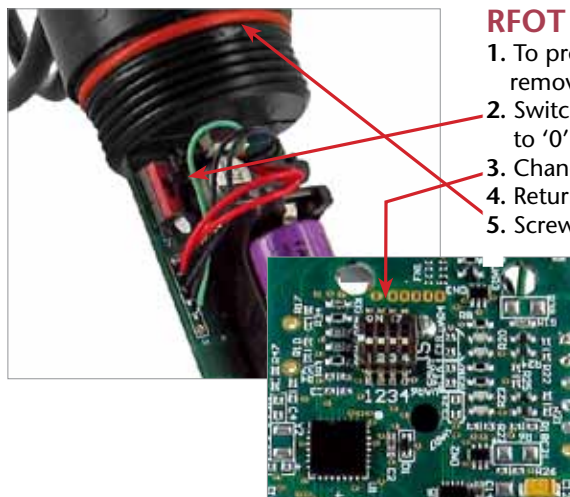
The images below show the options available for the switches for each channel. Channel 26 (all switches in the up position) is not supported.



Follow the instructions below to configure the channel settings of the MadgeTech Data Logger.

RFC1000 & RFC1000-IP69K

1. To program the channel on an RFC1000, first unplug the RFC1000.
2. Use a Phillips head screwdriver to unscrew the enclosure.
3. Find the dip switches located on the front of the PCB circuit board.
4. Change the dip switches to match the the desired channel using the diagram above.
5. Screw the enclosure back together and reconnect the RFC1000.



RFOT

1. To program the channel on an RFOT data logger, unscrew the body of the RFOT and remove the enclosure.
2. Switch the wireless **ON / OFF** switch (black switch, next to the probe cable connector) to '0'. The dip switches are located on the back of the PCB (opposite side of the battery).
3. Change the dip switches to match the channel of the RFC1000 using the diagram above.
4. Return the wireless **ON / OFF** switch to '1'.
5. Screw the body of the logger back together making sure the O-Rings are not visible.

Reverse side of the PCB
(opposite side of the battery)

Product Maintenance

(Battery compartment shown with cover removed)

Battery Replacement

Materials needed: TLH-5903 Replacement Battery

Procedure:

1. Unscrew the end cap from the logger.
2. Grasp the circuit board firmly on either side of the battery holder with one hand and pull the battery out of the holder with the other.
3. Install the new battery as shown by the diagram on the bottom of the battery holder.
4. Screw the body of the logger back together making sure the O-Rings are not visible.

Battery Warning

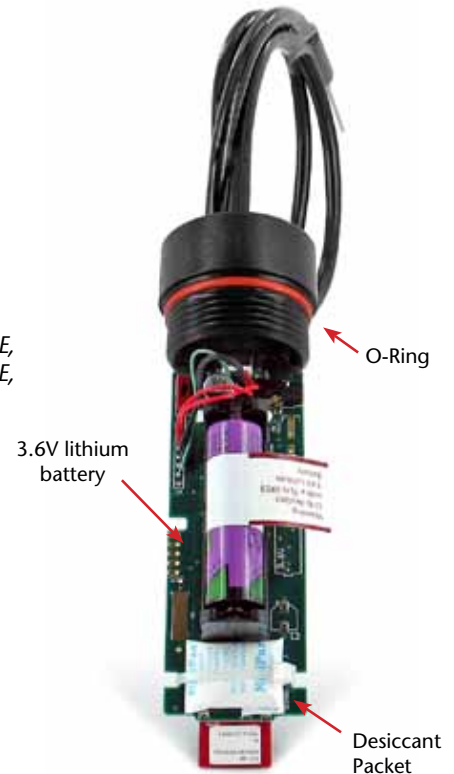
DISCARD USED BATTERY PROMPTLY. KEEP OUT OF REACH OF CHILDREN. DO NOT DISPOSE OF IN FIRE, RECHARGE, PUT IN BACKWARDS, DISASSEMBLE, OR MIX WITH OTHER BATTERY TYPES. MAY EXPLODE, FLAME, OR LEAK AND CAUSE PERSONAL INJURY.

O-Ring

Part Number: RFOT-O-Ring

Procedure:

1. Unscrew the end cap from the RFOT to expose the O-Ring.
2. Use a small pointed tool (knife or pick) to pry the old O-Ring out of its groove.
3. Make sure that the O-Ring groove is free of any dirt or debris.
4. Partially screw the mating parts back together leaving the O-Ring groove exposed.
5. Apply a thin coat of silicone based lubricant to the O-Ring.
6. Stretch the O-Ring over the cap and into its groove. **WARNING:** Avoid stretching the O-Ring over the threads! Sharp threads can cut the new O-Ring!



Maintenance:

MadgeTech data loggers come directly from the factory with high quality O-Rings that have been properly installed. As a user, there are only a few things that need to be remembered to maintain a functional O-Ring seal.

DO:

- Clean them frequently (use compressed air or a soft brush to avoid abrasion).
- Lubricate regularly (if it doesn't feel slippery, it needs to be lubricated). We recommend Parker® Super-O-Lube, but any silicone based O-Ring lubricant will work. This is most important on the seals that are frequently opened and closed for communication with the logger.
- Inspect the O-Ring regularly for signs of failure (see the reverse side of this pamphlet for details on what to look for)

DON'T:

- Poke, jab, pry at the O-Ring with sharp or pointed objects.
- Expose the O-Rings to harsh chemicals (when in doubt, call MadgeTech).
- Expose the seals to high pressure (all of MadgeTech's submersible data loggers are rated to 60 PSIG).
- Expose the seal to high temperatures (see data logger Specification Sheet for operating temperature range).

Desiccant Packet

Located on the board of the RFOT is a desiccant packet. The desiccant packet should be left in the case as it is supplementary protection against any additional moisture.

Recalibration

Recalibration is recommended annually for all MadgeTech data loggers. The Properties window in the MadgeTech 4 software displays the date of the last calibration and the date that the device is next due for calibration. The MadgeTech 4 Software can also be configured to send an on screen notification prior to the calibration due date for each device. By default this is set to seven days prior to calibration due date and can be changed by the user by going to the file tab in the MadgeTech 4 software and clicking on **Options**. Select device and check "Display popup notification when a device nears its next calibration date". The user can then select the number of days before calibration due date to notify.

Use the RMA system to submit the device for recalibration (see below).

Recalibration Pricing:

Recalibration traceable to NIST	\$70.00
Recalibration	\$40.00

RMA Instructions

To send a device back in to MadgeTech, follow the instructions below to create an RMA (Return Merchandise Authorization) on the MadgeTech website:

1. Visit **www.madgetech.com**, click on the **Services** tab, and select **RMA Process**.
2. When the web page opens, please sign in. If this is the first time, select **Click here to register an account** and create one. Once signed in, click on the **Make New RMA** button and fill in all the blank fields.
3. Complete the applicable fields on the form including customer Billing and Shipping information, even if they are the same. Please see the field explanation below for a more detailed description about questions asked in the Device Information section.
4. When all of the fields are complete, click **Generate RMA**.
5. Print out the confirmation page that follows containing the RMA number and MadgeTech's address for shipping. **A Return Merchandise Authorization must be accompanied by a copy of the RMA paperwork and shipping is prepaid by the customer.** The RMA number should be clearly marked on the outside of the package.
6. Please ship the package via UPS, FedEx, TNT, or DHL to the address listed on the confirmation page. USPS will not ship MadgeTech data loggers.
7. A notification email will be automatically sent when MadgeTech has received the RMA.

Compliance Information

- "This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."
- "To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter."
- "This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

- "Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication."

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante."



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